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February 28, 2007

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ATTN:

**EXAMINER J. SEIDLECK** 

FAX NO.:

TELEPHONE:

FROM:

Mark J. Henry

RE:

10/528,984

YOUR REFERENCE: 103-1025-US

OUR DOCKET: 1806.1006

NO. OF PAGES (Including this Cover Sheet)

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Mark J. Henry 202-454-1520 202-454-1579

Docket No.: 1806.1006

# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

RECEIVED CENTRAL FAX CENTER

Yoshito KURODA, et al.

FEB 2 8 2007

Serial No. 10/528,984

Group Art Unit: 1711

Confirmation No. 6397

Filed: March 24, 2005

Examiner: James. J. Seidleck

For:

GLYCOLIC ACID COPOLYMER AND METHOD FOR PRODUCING THE SAMEDIAGNOSIS

**PROGRAM** 

### **COMMUNICATION TO THE EXAMINER**

Commissioner for Patents PO Box 1450 Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed February 22, 2007, enclosed is a copy of an Amendment After Allowance and Declaration, which was filed on June 9, 2006. Also enclosed is a copy of the Patent Office date-stamped postcard. Applicants respectfully request that have not yet received notification that the Amendment has been entered.

As described in the remarks of the Amendment, the changes correct formal matters and do not require substantive examination. Accordingly, it is submitted that the Amendment should be entered even though the Application has been allowed.

Entry of the Amendment After Allowance is respectively request.

Respectfully submitted,

STAAS & HALSEY LLP

Date: February 28, 2007

Registration No. 36,162

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Washington, D.C. 20005 Telephone: (202) 434-1500 Facsimile: (202) 434-1501

# Please Date Stamp and return

Amendment After Allowance Under 37 CFR § 1.312 Declaration

APPLICANT(S):

Yoshito KURODA, et al.

SERIAL NO:

10/528,984

CONFIRMATION NO.

6397

TITLE:

GLYCOLIC ACID COPOLYMER AND METHOD FOR PRODUCING THE SAME

FILING DATE:

March 24, 2005

DOCKET NO:

1806.1006/MJH:nml

DUE DATE:

N/A





S&H Form: (2/01)

Docket No.: 1806.1006

### IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

RECEIVED
CENTRAL FAX CENTER

FEB 2 8 2007

In re the Application of:

Yoshito KURODA, et al.

Serial No. 10/528,984

Group Art Unit: 1711

Confirmation No. 6397

Filed: March 24, 2005

Examiner: Acquah, Samuel A.

For: GLYCOLIC ACID COPOLYMER AND METHOD FOR PRODUCING THE SAMEDIAGNOSIS PROGRAM

### **AMENDMENT AFTER ALLOWANCE UNDER 37 CFR § 1.312**

Commissioner for Patents PO Box 1450 Alexandria, VA 22313-1450

Sir:

This is in response to the Notice of Allowance mailed April 4, 2006, and having a period for response set to expire on July 4, 2006, the due date for the issue fee payment.

The following amendments and remarks are respectfully submitted. Reconsideration of the claims is respectfully requested.

NO. 1208

FEB 2 8 2007

Application No.: 10/528,984

### IN THE SPECIFICATION:

The specification as amended below with replacement paragraphs shows added text with underlining and deleted text with strikethrough.

Please amend the paragraph beginning at page 67, line 15 as follows:

-As an amino acid used in the present invention, a C2-C20 amino acid is preferred. Specific examples of such amino acids include glycine, (+)-alanine, β-alanine, (-)-asparagine, (+)-aspartic acid, (-)-cysteine, (+)-glutamic acid, (+)-glutamine, (-)-hydroxylysine, (-)-leucine, (+)isoleucine, (+)-lysine, (-)-methionine, (-)-serine, (-)-threonine, (+)-valine, aminolastic aminobutyric acid, azaserine, alginine and ethionine.—

Please amend the paragraph beginning at page 68, line 7 as follows:

--As a factam used in the present invention, a C<sub>2</sub>-C<sub>20</sub> lactam is preferred. Specific examples of such lactams include glycine anhydride, β-propiolactam, α-pyrrolidone, α-piperidone, ε-caprolactam, α-methyl-caprolactam, α-methyl-caprolactam β-methylcaprolactam, γ-methyl-caprolactam, δ-methyl-caprolactam, ε-methyl-caprolactam, Nmethyl-caprolactam, β,γ-dimethyl-caprolactam, γ-ethyl-caprolactam, γ-isopropyl-caprolactam, εisopropyl-caprolactam, γ-butyl-caprolactam, γ-hexacyclobenzyl-caprolactam, φ-enantholactam, ω-capryllactam, caprylolactam, laurolactam and a dimer of caprolactone.—

Application No.: 10/528,984

Please amend the paragraph beginning at page 123, line 3 as follows:

--20 mg of a glycolic acid copolymer which has been dried at 80 °C under a pressure of  $1\times 10^2$  Pa for 6 hours is weighed and, then, dissolved in 3 g of the above-mentioned eluent, followed by filtration using a filter having a mesh size of  $2.0.2~\mu m$ , thereby obtaining a sample solution.--

Application No.: 10/528,984

Please amend Table 1 at page 258 as follows:

S&H Form: (2/01)

			Example 1	Example 2	Example 3	Example 4	Example 5
	Weight average molecular weight (MW)	cular weight (MW)	123,000	186,000	182,000	167,000	179,000
	Content of glycolic acid monomer units mote)	id monomer units (% by	63.97	68.97	93.97	16.91	76.98
	100	Туре	Lactic acid	Lactic acid	Lactic scid	6-hydroxyhexanolc acid	3-hydroxybutylic acid
	hydroxycarboxylic acid monomer nole	Content (% by mole)	16.00	11.00	6.00	11.00	11.00
Results of		Average chain length	1.08	1.02	1.02	1.03	1.02
of the	Content of diglycolic acid monomer uni by weight mole)	acid monomer units (%	0.03	0.03	0.03	0.03	0.03
copolymer	Patyol manamer	Турв	•	,			
	units	Content (% by mole)	,		,		•
	Polycarboxyfic acid	Тура	•			•	
	monomer units	Content (% by mole)	•	•	1	,	
	Total content of polycarboxylic ackd monor units including polyol monomer units and dielevings acid monomer units (%, by mole)	Total content of polycarboxylic ackl monomer units including polyol monomer units and delivenite acid monomer units (%, by mole)	0.03	0.03	0.03	0.03	. 0.03
	Degree of discoloration of copolymer	n of copolymer	28	29	29	. 29	28
	Degree of discoloration after the melt he stability test	on after the molt heat	36	38	43	88	39
Results of	Oxygen gas permeabi sheet (c	Oxygen gas permeability of the melt-shaped sheet $(cc/m^2 \cdot day \cdot atm)$	9.1	8.0	7.2	8.1	9.0
evaluation	Strength of the mett-shaped sheet	haped sheet	4	5 or more	ajoul jo g	5 or more	5 or more
	Blodegradability of the soil	Blodegradability of the meth-shaped sheet in soil	Biodegradabla	Biodegradable	Blodegradable	Biodegradable	Biodegradable
Note: "- mean	Note: "-" means "not detected".						

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Application No.: 10/528,984

Please amend Table 2 at page 259 as follows:

			Comparative Exemple 1	Comparative	Comparative	Сотрагайуа
	Weight average molecular weight (Mw	valght (Mw)	109,000	164,000	122,000	187,000
	Conlent of glycolic acid monomer unit	nomer unit (% by weight <u>mole</u> )	38.86	16:96	72.96	88.97
	Nan-qiycelic.	Туре	Lactic acid	Lactic acid	Lactic acid	Lactic acid
	hydroxycarboxylic acld	Content (% by male)	11.01	3.00	27.01	11.00
1		Average chain fength	1.02	1.01	1.14	1.62
Tresums of the analysis	Content of digiycalic acid monomer un	onomer unit (% by mole)	0.13	0.03	0.03	0.03
oblained		Тура	1	•	,	•
copolymer	Polyo monomer units	Content (% by mole)	•	•		1
	Polycarboxylic acld	Тура	t	T		ı
	monomer units	Content (% by male)	1		•	
	Tolal content of polycarboxyl polyol monomer units and dimole)	Total content of polycarboxylic acid monomer units tirduding polyol monomer units (% by mole)	0.13	0.03	0.03	0.03
Ţ	Degree of discoloration of copolymer	շրօկչուցո	34	33	33	29
	Degree of discoloration after the melt	The melt heal stability test	175	115	39	105
Results of	Oxygen gas permeability of a meti-shaped sheet (cd/m²-day-atm)	a mell-shaped sheel	8.2	7,0	35.0	8.4
evaluation	Strength of the melt-shaped sheet	sheet	4	5 ог тоге	4	5 or more
·	Blodegradability of the melt-shaped sheet in soll	shaped sheet in soll	Biodegradable	Biodegradable	Blodegradable	Biodegradable
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Note: "-" means "not detected".

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Application No.: 10/528,984

Please amend Table 3 at page 260 as foliows:

			Ехатрю 6	Example 7	Example 8	Example 9	ple 9	Exam	Ехатрів 10
	Weight everage molecular weight (MW)	lar weight (NW)	187,000	167,000	325,000	330,000	000	163,	163,000
	Content of glycolic acid	Content of glycolic acid monomer unita (% by mole)	88.94	98.94	88.98	88.94	94	.88	98.97
	Non-glycofic,	Туре	Lactic acid	Lactic acid	Lactic acid	Lactic acid	: acid	Laclic actd	: acid
•	hydroxycarboxyllc acfd	Content (% by mole)	10,99	10.99	10.98	10.98	96	10.	10.94
	monomer units	Average chain tength	1.01	1.01	1.01	1.01	7	1.01	74
Results of	Content of diglycalic act	Content of diglycalic acid monomer unil (% by mole)	0.03	0.03	0.03	0.03	23	₽0'0	<b>J4</b>
Use analysis of the	Polyol manomer units	Туре	Neapentyl glycol	1,6- hexanediol	Trimethylolprop ane	Neopanlyf 9tycol	Trimethy dolpr opena	Neopentyl	Trimethylotpr opene
copolymer		Content (% by mole)	0.04	0.04	0.01	20.0	0.01	0.04	0.01
	Polycai boxylic acid	Туре	-	•	•	•		r	
	monomer units	Content (% by mole)	-	,		,			
	Total content of polycarb polyol monomer units an mole)	Total content of polycarboxylic acid monomer units including polyol monomer units and diglycolic acid monomer units (% by mole)	70.0	0,07	0.04	0.08	8	0.09	6(
	Degree of discoloration of copolymer	of capalymer	29	33	34	EE	1	39	
	Degree of discoloration	Degree of discoloration after the meld <u>mell</u> heat stabilly test	66	43	44	44		48	
Results of	Oxygen gas permeability of a melt-shaped sheet ( $cc/m^2$ -day, atm)	y of a nielt-shaped sheet	8.3	8.2	8.3	8,6		8.7	
evaluation	Strangth of the melt-shaped sheet	ped sheet	5 от тоге	5 or more	5 or more	5 or more	nore	5 ог того	поге
	Blodegradebility of the mell-shaped sheet	nell-shaped sheet in soil	Biodegradable	Biodegradable	Biodegradable	Biodegradable	adabío	Biodegradable	adable
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Note: "-" means "not detected".

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Application No.: 10/528,984

 			Example 11	Example 12	Example 13	Example 14	Example 15	Comparative e Example 5
	Weight average molecular weight (Mw)	cular weight (Mw)	186,000	185,000	189,000	280,000	189,000	165,000
	Content of glycolic aci	Content of glycolic acid monomer unit (% by mole)	88.96	88.96	88.63	88.62	68,26	93.95
	Non-olympia	Туре	Laclic acld	Laclic acid	Laclic acid	Lactic acid	Lactic acid	Lactic acid
	hydroxycarboxylic	Content (% by mote)	10.96	10.98	9.57	95'6	7.93	4.21
	acid monomer units	Average chain length	1.01	1.01	1.05	1.01	1.05	1.02
Results of the analysis	Content of diglycolic a	Content of digitycolic acid monomer unit (% by mole)	0.04	0.03	0.03	0.03	0.03	0.03
	Polyal monomer	Турв	Neopentri giyodi	Neopeniyi giyesi	Nacyonly Olycol	Neopeanyl Trismethylotprop glycol sne	op Neopenlyl glycol	Mangenty Mange
copolymer	units	Content (% by male)	0.04	0.04	0.90	0.90 0.01	1.91	26'0
	Polycarboxylic acid	Туре	-	Oxalic acid	Adipic acid	Adípic acid	Adiple acid	Adipic acid
	monomer units	Content (% by mole)		0.01	0.87	0.88	1.88	0.89
	Total content of Polyca monomer units and die	Total content of Polycarboxylic acid monomer units including polyot monomer units and diglycolic acid monomer units (% by mate)	0.08	0.08	1.80	1.82	3.62	1.84
	Degree of discoloration of copolymer	in of copolymer	29	28	30	33	30	34
	Degree of discoloralio	Degree of discoloration after the meld <u>melt</u> heat slability test	40	39	39	42	38	110
Results of	Oxygen gas permeabl (cdm <sup>2</sup> -day-elm)	Oxygen gas permeability of a melt-shaped sheel (cc/m²-day-alm)	8.5	8.5	8.8	9.2	12.0	B.3
evaluation	Strength of the mett-shaped sheet	haped sheet	. 5 от тогв	5 ог тога	5 or more	5 or more	5 or more	5 or more
	Blodegradabilily of the	Blodegradability of the melt-shaped sheet in soil	Biodogradab! e	Biodegradabl e	Biodegradabl	Biodegradable	Biodegrada	Blodegrada

Application No.: 10/528,984

Please amend Table 5 at page 262 as follows:

			Example 16	Example 17	Ехапріе 18	Exemple 19	Example 20
	Weight average molecular weight (Mw)	reight (Mw)	178,000	148,000	132,000	152,000	93,000
	Content of glycotic acid mon	nomer unit (% by mole)	88.98	88.93	88,91	88.92	88.98
	Non-glycolic,	Туре	Laclic acid	Lactic acid	Lactic acid	Laclic acid	Lactic acid
***************************************	hydroxycarboxyllo acid	Content (% by mole)	11.00	11.01	11.01	11.01	11.00
	monomer units	Average chain length	1.02	1.05	1.02	1.02	1.02
Results of	Content of digiyoolic acid monomer unit (% by mole)	anomer unit (% by mole)	0.02	0.08	80'0	0.07	0.02
the analysis of the	Polval monomer units	Туре	•			•	·
obtained		Conlant (% by mole)	1	•	ŀ		-
	Polycarboxylic acid	Туре	•	•	•	,	,
	monomer units	Content (% by mote)	ı	1			,
	Total content of polycarboxyl including polyol monomer un monomer units (% by mole)	lic acid monomer units its and diglycolic acid	0.02	0.05	0.08	0.07	0.02
_	Degree of discoloration of copolymer	polymer	28	28	28	28	27
	Degree of discoloration after test	the साधी हाड़ी heat stability	39	44	48	46	38
Results of	Oxygen gas pemeability of a (oc/m²-day-alm)	a mell-shaped sheet	8.1	8.1	8.0	8.0	8.1
	Strength of the melt-shaped	sheet	5 or more	5 or more	5 or more	5 or more	4
·	Biodegradebility of the mett-shaped sheet in soil	haped sheet in soil	Blodegradable	Biodegradable	Biodegradable	Biadegradable	Biodegradable

Note: \*-" means "not detected".

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Application No.: 10/528,984

Please amend Table 6 at page 263 as follows:

			Comparative	Comparative	Comparative	Сопратайие	Сотрагайча	Comparative
			Example 6	Example 7	Example 8	Example 9	Exampte 10	Example 11
	Weight average molecular weight (Mw)	(Mw)	186,000	179,000	184,000	109,000	175,000	183,000
	Content of glycolic acid monomer unit (%	unit (% by mole)	98.59	68.58	29.69	88.84	06.46	83.00
		Туре	Lactic acid	Lactic acid	Lactic acid	Lactic acid	Lacilo acid	Lactic acid
	Non-glycolic, hydroxycarboxylic acid monomer units	Content (% by mole)	11.00	11.00	11.00	11.02	6.00	17.00
		Average chain length	1.02	1.02	1.02	1.02	2.08	2.36
Results of the analysis	Content of diglycolic acid monomer unit (% by mole)	er unit (% by mole)	0,20	0.21	0,18	0.14	-	ı
of the oblained	Polyol monomer units	Туре	Neopenlył glycol	Neopenlyl glycol	Neopentył glycol	t	•	•
copolymer		Content (% by mote)	0.21	0.21	0.20	1	3	•
	Polycarboxylic acid monomer	Туре	-	•	1	•	1	•
	units	Content (% by mole)	•	•	1	ł		•
	Total content of polycarboxylic ackt monomer units including polyol monomer units and diglycolic acid monomer units (% by mole)	d monomer units id diglycolic acid	0.41	. 0.42	0.38	0.14	-	,
	Degree of discoloration of copolymer	Пел	40	39	37	38	30	29
	Degree of discoloration after the mold <u>mail</u> heat stability test	<del>nold <u>mall</u> heat stability</del>	224	242	196	158	92	58
Results of	Oxygen gas permeability of a metk-shaped sheel (co/m²-day-alm)	l-shaped sheel	8.7	8.8	8.8	6.3	9.8	28.0
, ,	Strangth of the melt-shaped sheet		5 or more	5 or more	6 or more	4	5 or more	5 or more
	Biodegradability of the melt-shaped sheel	ed sheet in soil	Biodegradable	. Biodegradable	Blodegradable	Biodegradabío	Biodegradable	Biodegradable

Note: "" means "not detected".

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Application No.: 10/528,984

#### REMARKS ·

Amendments to page 67, line 22, page 68, line 11 and page 123, line 7 are merely corrections of inadvertent errors which occurred at the time of the translation into English of the original Japanese PCT specification. Amendments to page 258, Table 1 and page 259, Table 2 (i.e., the amendments to change "% by weight" to --% by mole--) are also merely corrections of inadvertent errors which occurred at the time of the translation into English of the original Japanese PCT specification.

In support of the above-mentioned amendments, the Applicant attaches hereto a DECLARATION to verify that the amendments are made only to correct inadvertent errors which occurred at the time of the translation into English of the original Japanese PCT specification.

Amendments to page 260, Table 3, page 261, Table 4, page 262, Table 5 and page 263, Table 6 are merely corrections of apparent clerical errors. Support for these amendments (to change "meld" to --melt--) is found, for example, at page 258, Table 1 (after "Degree of discoloration after the") of the present specification.

In accordance with the above, it is submitted that the foregoing changes should not require further substantive consideration by the Examiner. Accordingly, entry at this after-final stage of prosecution is fully appropriate. The Examiner is requested to issue a Supplemental Notice of Allowably to confirm that the changes have been entered. Because the application has been allowed, this matter is somewhat urgent.

Finally, if there are any formal matters remaining after this Amendment, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: July 9 22

Mark J. Henry

Registration No. 36,162

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Washington, D.C. 20005 Telephone: (202) 434-1500

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#### DECLARATION

I, Kenji KABUKI, c/o the Inoue & Associates of 3rd Floor, Akasaka Habitation Building, 3-5, Akasaka 1-chome, Minato-ku, Tokyo, Japan do solemnly and sincerely declare that I am conversant with the Japanese and English languages and that I believe:

that the description "aminolactic acid" at page 67, line 22 of the English specification should be amended to --aminobutyric acid--;

that the description " $\alpha$ -methyl-caprolactam" at page 68, line 11 of the English specification should be amended to  $--\beta$ -methyl-caprolactam--;

that the description "2" at page 123, line 7 of the English specification should be amended to --0.2--;

that the description "% by weight" at page 258, Table 1 (after "Content of diglycolic acid monomer units") of the English specification should be amended to --% by mole--; and that the description "% by weight" at page 259, Table 2 (after "Content of glycolic acid monomer unit") of the English specification should be amended to --% by mole--.

These amendments are merely corrections of inadvertent errors which occurred at the time of the translation into

English of the original PCT specification. The attached copies of revised pages 67, 68, 123, 258 and 259 of the English specification are true and correct translations of the corresponding pages of the international patent application No. PCT/JP03/12165. The English description "aminobutyric acid" in the English specification at page 67, line 22 is a correct English translation of the Japanese description "アミノ路酸" in the original Japanese PCT specification at page 57, line 8. The English description " $\beta$ -methyl-caprolactam" in the English specification at page 68, line 11 is a correct English translation of the Japanese description "β-メチルーカプロラクタム" in the original Japanese PCT specification at page 57, line 21. The English description "0.2" in the English specification at page 123, line 7 is a correct English translation of the Japanese description "0.2" in the original Japanese PCT specification at page 95, lines 7 to 8. The English description "% by mole" in the English specification at page 258, Table 1 (after "Content of diglycolic acid monomer units") is a correct English translation of the Japanese description "+  $\mathcal{N}\%$ " in the original Japanese PCT specification at page 179, Table 1 (after "ジグリコール酸単位含有率"). The English description "% by mole" in the English specification at page 259, Table 2 (after "Content of glycolic acid monomer unit") is a

correct English translation of the Japanese description "+ N%" in the original Japanese PCT specification at page 180. Table 2 (after "グリコール酸単位含有率").

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

March 29, 2005

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lected from the group consisting of aliphatic dicarboxylic acids, such as exalic acid, malonic acid, gulutaric acid, succinic acid, adipic acid, pimelic acid,
suberic acid, azelaic acid, sebacic acid, undecanedicarboxylic acid, dodecanedicarboxylic acid and 1,4cyclohexanedicarboxylic acid, and a derivative thereof;
and aliphatic tricarboxylic acids, such as propanetricarboxylic acid, trimellitic acid, pyromellitic acid
and 1,3,6-hexanetricarboxylic acid, and a derivative
thereof.

In addition, other compounds, such an amino acid, a polyamine and a lactam, may be used as a comonomer in an amount which does not adversely affect the properties of the present invention.

As an amino acid used in the present invention, a C<sub>2</sub>-C<sub>20</sub> amino acid is preferred. Specific examples of such amino acids include glycine, (+)-alanine, β-alanine, (-)-asparagine, (+)-aspartic acid, (-)-cysteine, (+)-glutamic acid, (+)-glutamine, (-)-hydroxylysine, (-)-leucine, (+)-isoleucine, (+)-lysine, (-)-methionine, (-)-serine, (-)-threonine, (+)-valine, aminobutyric acid, azaserine, alginine and ethionine.

As a polyamine used in the present invention, a  $C_1$ - $C_{20}$  polyamine is preferred. Specific examples of

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such polyamines include methylhydrazine, monomethylenediamine, dimethylenediamine, trimethylenediamine,
tetramethylenediamine, pentamethylenediamine, hexamethylenediamine, heptamethylenediamine, octamethylenediamine, nonanemethylenediamine, decamethylenediamine, undecamethylenediamine and dodecamethylenediamine.

As a lactam used in the present invention, a  $C_2$ - $C_{20}$  lactam is preferred. Specific examples of such lactams include glycine anhydride,  $\beta$ -propiolactam,  $\alpha$ -pyrrolidone,  $\alpha$ -piperidone,  $\epsilon$ -caprolactam,  $\alpha$ -methyl-caprolactam,  $\beta$ -methyl-caprolactam,  $\gamma$ -methyl-caprolactam,  $\delta$ -methyl-caprolactam,  $\epsilon$ -isopropyl-caprolactam,  $\epsilon$ -isopropyl-caprolactam,  $\epsilon$ -butyl-caprolactam,  $\epsilon$ -capryllactam, caprylolactam, laurolactam and a dimer of caprolactone.

Among the above-mentioned compounds, when a compound has an asymmetric carbon atom and the compound exists in a D-form, an L-form or a mixture of D- and L-forms, any one of these forms may be used.

With respect to the forms of the raw materials used (i.e., glycolic acid, a derivative of glycolic acid, and a compound copolymerizable with glycolic acid and/or derivative of glycolic acid), there is no par-

hexafluoroisopropanol to prepare a solution (hereinafter referred to simply as "eluent").

20 mg of a glycolic acid copolymer which has been dried at 80 °C under a pressure of 1  $\times$  10<sup>2</sup> Pa for 6 hours is weighed and, then, dissolved in 3 g of the above-mentioned eluent, followed by filtration using a filter having a mesh size of 0.2  $\mu$ m, thereby obtaining a sample solution.

With respect to the sample solution, GPC is per-10 formed under conditions wherein the column temperature is 40 °C and the flow rate of the eluent is I ml/minute. In the GPC, the sample solution is flowed through three different columns (TskguardcolumnHHR-H (tradename) as a guard column; and Tskgel (tradename) G5000HHR and 15 Tskgel (tradename) G3000HHR, each of which is manufactured and sold by TOSOH Corporation, Japan) which are connected in series. A calibration curve is obtained in advance from the elution times of standard monodisperse polymethyl methacrylate samples (which, respec-20 tively, have known weight average molecular weights of 1,577,000, 685,000, 333,000, 100,250, 62,600, 24,300. 12,700, 4,700, 1,680 and 1,140) (manufactured and sold by Polymer Laboratories Ltd, U.K.) and a methyl methacrylate monomer (molecular weight: 100), which 25 elution times are determined by an RI detector. The

Table 1

258

3-hydroxybutylic Biodegradable Example 5 179,000 5 or more 88.97 acid 11.00 1.02 0.03 0.03 0.0 28 39 6-bydroxyhexanoic Blodegradable Example 4 167,000 S or more 88.97 11.00 acid 1.03 0.03 0.03 29 38 Blodegradable Lactic acid Example 3 182,000 5 or more 93.97 9.00 T . 02 0.03 0.03 7.2 29 Ç **B**todegradable Lactic acid Example 2 5 or more 186,000 88.97 11.00 1.02 0.03 0.03 B. D 59 38 Biodagradable Lactic acid Example 1 123,000 83.97 16.00 1.08 0.03 0.03 36 28 Weight average molecular weight (Mw) Total content of polycarboxylle acid Degree of discoloration of copolymer Content of diglycolic acid monomer Blodegradability of the melt-shaped mononner units and diglycolic acid Content of glycolic acid monomer Degree of discoloration after the Strength of the melt-shaped sheet Content (% by Average chain Content (% by Cantent (& by monomer units Including polyol Oxygen gas permeability of the manomer units (\* by mole) melt heat stability test length mole) mole] mole) Type Туре Туре units (% by mole) melt-shaped sheet units (4 by mole) hydroxycarbox-Polycarboxylic Polyol monomer [cc/m2.day.atm] monomer units Non-glycolic, sheet in soil acid monomer ylic acid units units Results of Results of copolymer analysis obtained evalueof the tion

Note: "-" means "not detected",

Table 2

		-	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4	
	Weight average molecul	olar weight (Mw)	000,601	164,000	122,000	187,000	
	Content of glycolia ac	Content of glycolic acid monomer unit (% by mole)	88.86	76,39	72.96	48.97	_
	Non-qlycolic, hy-	Туре	Lactic acid	Lactic acid	Lactic acid	Lactic acld	
	droxycarboxyllc acid	Content (% by mole)	11.01	3.00	27.01	11.00	
Results of	monomer antes	Average chain length	1,02	1.01	1.14	1.62	
the analysis	Content of diglycolic mole)	sacid monamer unit (% by	0.13	0.03	0.03	0.03	
of the		Type	-	,	,	,	
copolymer	Polyol monomer units	Content (% by mole)	•	ı	ı	1	25
	Polycarboxylic acid	Туре	ı	1	•	3	,
	monomer units	Content (* by mole)	1	r	,	1	
	Total content of polycunits including polyolgists acid monomer	Total content of polycarboxyllc acid monomer units including polyol monomer units and digitycolic acid monomer units (1 by mole)	0.13	60.03	0.03	0.03	
-	Degree of discoloration of copolymer	lon of copolymer	ň	33	33	59	· —-
	Degree of discolorati	Degree of discoloration after the melt heat stability test	175	115	39	105	
Results of	Oxygen gas permeability (cc/m².day.atm)	ity of a melt-shaped sheet	В.2	7.0	0'50	8,4	
tion	Strength of the melt-shaped sheet	shaped sheet		5 or more	Þ	5 or mote	<del></del>
	Biodegradability of th	Biodegradability of the melt-shaped sheet in soil	Biodegradable	Biodegradable	Biodegradable	Biodegradable	,
							ı

Note: '-' means 'not detected'

アミノ酸としては、炭素数2~20のアミノ酸が好ましい。 アミノ酸として、例えば、グリシン、(+)-アラニン、β - アラニン、(-)-アスパラギン、(+)-アスパラギン 酸、(-)-システイン、(+)-ゲルタミンサン、(+) ーグルタミン、(-)ーヒドロキシリシン、(-)ーロイシン、 (+) - イソロイシン、 (+) - リシン、 (-) - メチオニ ン、(-)-セリン、(-)-トレオニン、(+)-バリン、 アミノ酪酸、アザセリン、アルギニン、エチオニン等が挙げ られる。

多価アミンとしては、炭素数 1 ~ 2 0 の多価アミンが好ま しい。アミンとして、例えば、メチルヒドラジン、モノメチ レンジアミン、ジメチレンジアミン、トリメチレンジアミン、 テトラメチレンジアミン、ペンタメチレンジアミン、ヘキサ メチレンジアミン、ヘプタメチレンジアミン、オクタメチレ ンジアミン、ノナメチレンジアミン、デカメチレンジアミン、 ウンデカメチレンジアミン、ドデカメチレンジアミン等が挙 げられる。

ラクタムとしては、炭索数2~20のラクタムが好ましい。 ラクタムの具体例として、グリシン無水物、プロパンラクタ ム、αーピロリドン、αーピペリドン、εーカプロラクタム、  $\alpha$  - メチル - カプロラクタム、 $\beta$  - メチル - カプロラクタム、 ィーメチルーカブロラクタム、δ ーメチルーカプロラクタム、 ε - メチル - カプロラクタム、N - メチル - カプロラクタム、 ルオロイソプロパノールを調製しておく。具体的には、ヘキ サフルオロイソプロパノール1000gに対して、トリフル オロ酢酸ナトリウム 6. 48gを溶解して溶液(以下、「溶 離液」と略記する)を調製する。

評価用グリコール酸共重合体の試料溶液としては、80℃、 1 × 1 0 <sup>2</sup> P a で 6 時 間 乾 燥 し た グ リ コ ー ル 酸 共 重 合 体 2 0 mgを精秤した後、前記溶離液3gに溶解し、その後、0. 2μπのフィルターにて濾過したものを用いる。

カラム温度40℃にて、溶離液を流量1m1/分の条件下 でカラム(カラム構成は、ガードカラムとして日本国東ソー (株) 社製TskguardcolumnHHR-H(登録 商標)を用い、日本国東ソー(株)製Tskgel(登録商 標)G5000HHR、及び日本国東ソー(株)製Tskg el(登録商標)G3000HHRの各1本ずつを直列に配 置] を通し、分子量1,577,000、685,000、 3 3 3 , 0 0 0 , 1 0 0 , 2 5 0 , 6 2 , 6 0 0 , 2 4 , 3 00,12,700,4,700,1,680,1140*0*, 分子量既知の英国Polymer Laboratorie s 社 製 単 分 散 ポ リ メ タ ク リ ル 酸 メ チ ル 標 準 物 質 、 及 び メ タ ク リル酸メチルモノマー(分子量100)のRI検出による溶 出 時 間 か ら 求 め た 検 量 線 を 予 め 作 成 し 、 そ の 溶 出 時 問 か ら 重 - 量平均分子量を算出する。

(4) グリコール酸共重合体の融点

179

				χ <sub>1</sub>			
			映施倒1	実施例2	実施例3	実施例4	実施例5
	重量平均分子量(Mw)	(Mw)	123,000	186,000	182,000	167,000	179,000
	グリコール酸単位含有率	2含有率(モル%)	83.97	88.97	93.97	88.97	88.97
	グリコール酸単	種類	乳酸	乳酸	乳酸	6-tドロキシヘキサノイック アシット	3-ヒドロキシブチリックアシット
	位以外の FFロキシカル	含有率(モル%)	16,00	11.00	6.00	11.00	11.00
(2) 大 大	ボン酸単位	平均連鎖長	1.08	1.02	1.02	1.03	1.02
東京などの大学を関係を表現である。	ングリコール酸単	ジグリコール酸単位含有率(モル%)	0.03	0.03	0.03	0.03	0.03
の方ជ値	少班 = 十二十	種類		}		-	to-to-
	インケーケ甲位	含有率(モル%)	1	ı	. !		į
	ポンセドボン数	種類	l	1	   1 		
	単位	含有率(モル%)	1	ı			1
	ポリオール単位と を含めたポリカル 率の総和(モル%	ポリオール単位とジグリコール酸単位 を含めたポリカルボン酸単位の含有 率の総和(モル%)	0.03	0.03	0.03	0.03	0.03
	樹脂の着色度		28	53	29	29	28
	溶融熱安定性評価後の着	価後の着色度	96	38	43	38	39
等 面面	溶融成形シートの酸素ガス透過度 (cc/m2·day·alm)	)酸素ガス透過度 ilm}	9.1	8.0	7.2	B.3	8.0
	溶融成形シートの強度	)強度	4	5以上	5以上	5以上	5以上
	溶融成形シートの土中崩	0土中崩壊性	6 阜	有り	有り	有り	有り
では、ない	一日 栓 サイケ だい・ レガー						

一印.検出されないことを示す。

		1	<del>-</del>		1	γ	1		_ <u>l</u>	80	1		<del></del>	1	T	1	1
	比較例4	187,000	88.97	乳酸	11.00	1.62	0.03		1 .	     	1	0.03	29	105	8.4	4点3	有り
	比較例3	122,000	72.96	乳酸	27.01	1.14	0.03		1	1	1	0.03	33	39	35.0	4	有り.
	比較例2	164,000	96.97	乳酸	3.00	1.0.1	0.03	1	1		1	0.03	33	115	7.0	নগ্ৰন্থ	有り
表2	比較例1	109,000	88.86	乳酸	11.01	1.02	0.13	1	1	1		0.13	34	175	8.2	4	有り
		(	率(モル%)	種類	含有率(モル%)	平均連鎖長	有率(モル%)	極類	含有率(モル%)	種類	含有率(モル%)	ポリオール単位とジグリコール磁単位を含めたポリカルボン酸単位の含有率の総和 (モル%)		の着色度	ガス透過度		崩壞性
		重量平均分子量(Mw)	グリコール酸単位含有率(モル%)	グリコール酸単位以	がら ヒドロキシカルボン酸	单位	ジグリコール酸単位含有率(モル%)	# + 1	小ツタール単位	是11七二年, 晚里在	日本はこれがいい	ポリオール単位とジグリ リカルボン酸単位の含え	樹脂の着色度	溶融熱安定性評価後の	溶融成形シートの酸素ガス透過度(cc/m2·day·atm)	溶融成形シートの強度	溶融成形シートの土中崩壊性
							得られた井重合体	の分析値			•	•		•	四		

一印:検出されないことを示す。